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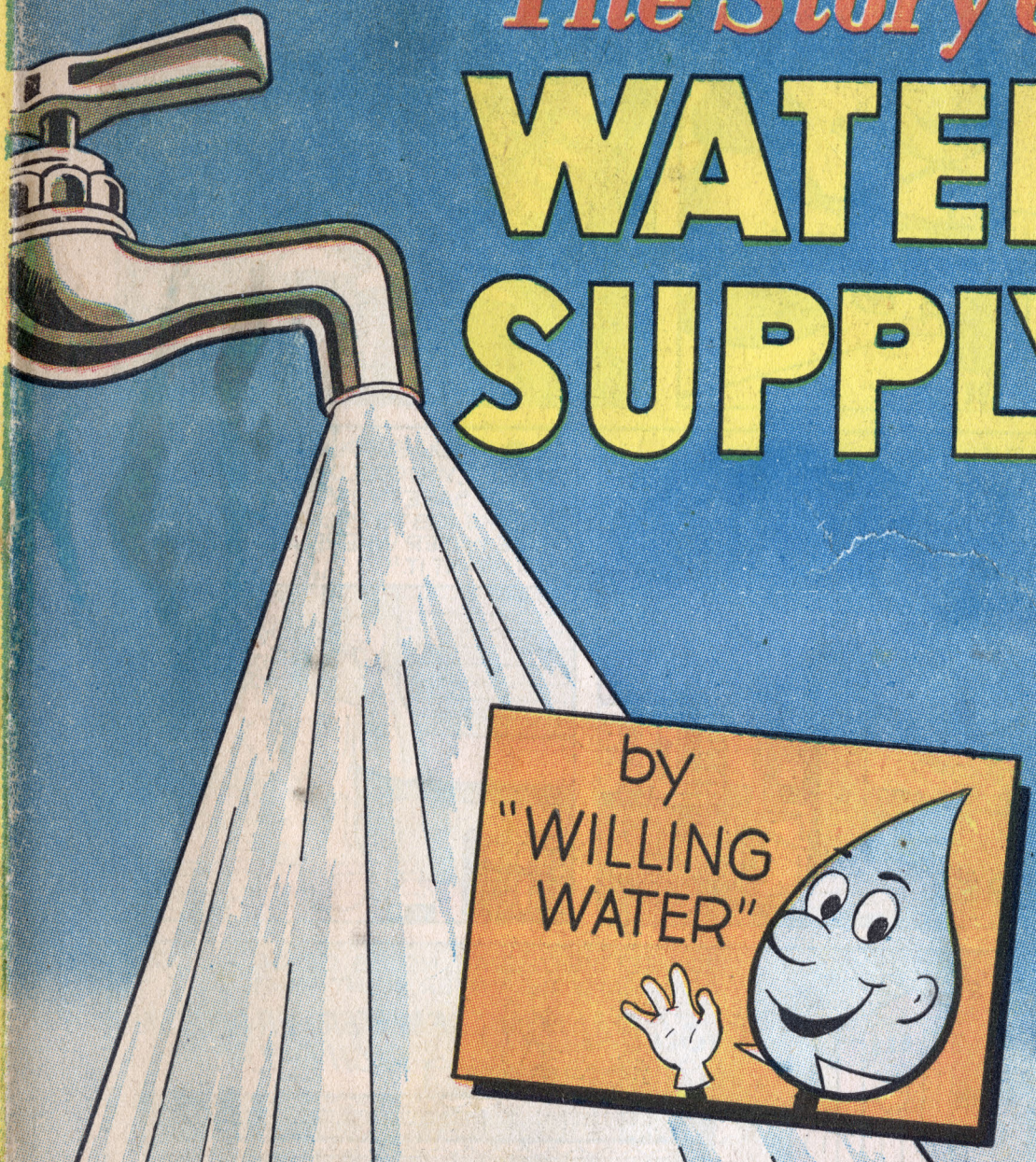
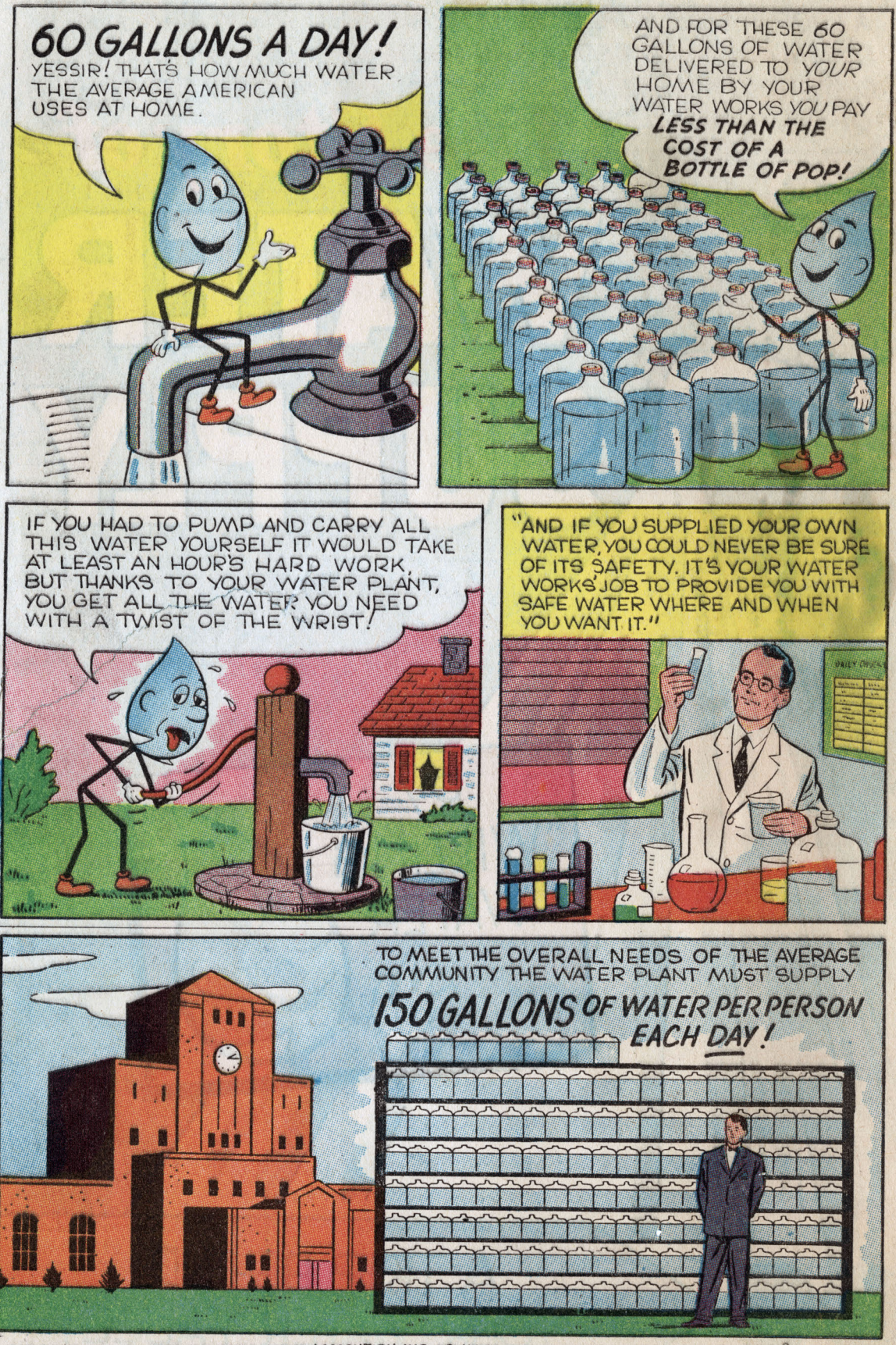
# The Story of WATER SUPPLY




A TRIP BEHIND
YOUR WATER FAUCET


60 GALLONS A DAY!
YESSIR! THAT'S HOW MUCH WATER THE AVERAGE AMERICAN USES AT HOME.
AND FOR THESE 60 GALLONS OF WATER DELIVERED TO YOUR HOME BY YOUR WATER WORKS YOU PAY LESS THAN THE COST OF A BOTTLE OF POP!
IF YOU HAD TO PUMP AND CARRY ALL THIS WATER YOURSELF IT WOULD TAKE AT LEAST AN HOUR'S HARD WORK, BUT THANKS TO YOUR WATER PLANT, YOU GET ALL THE WATER YOU NEED WITH A TWIST OF THE WRIST!
"AND IF YOU SUPPLIED YOUR OWN WATER, YOU COULD NEVER BE SURE OF ITS SAFETY. IT'S YOUR WATER WORKS' JOB TO PROVIDE YOU WITH SAFE WATER WHERE AND WHEN YOU WANT IT."
TO MEET THE OVERALL NEEDS OF THE AVERAGE COMMUNITY THE WATER PLANT MUST SUPPLY
150 GALLONS OF WATER PER PERSON EACH DAY!

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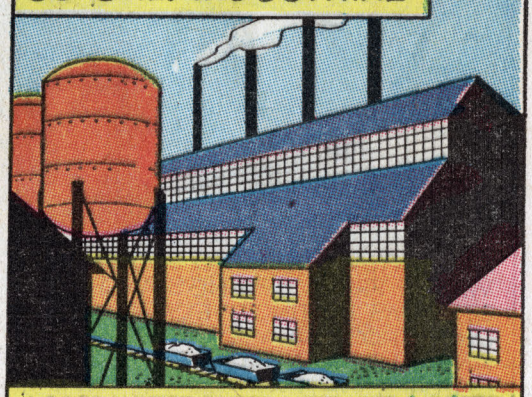
A GOOD WATER SUPPLY IS ESSENTIAL TO THE HEALTH, CLEANLINESS, COMFORT, AND PROSPERITY OF YOUR COMMUNITY. HERE IS HOW THOSE 150 GALLONS OF WATER ARE USED IN YOUR COMMUNITY.

## 60 GAL.- RESIDENTIAL

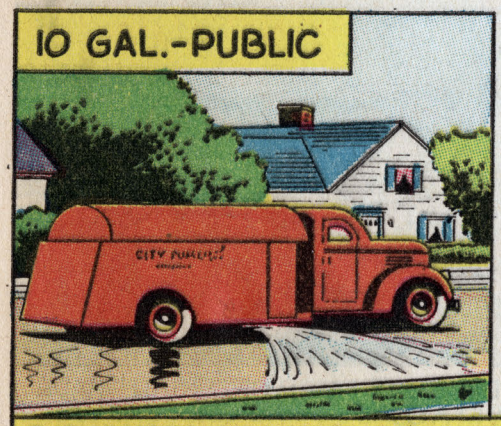
RESIDENTIAL USES OF WATER INCLUDING DRINKING, COOKING, LAUNDERING, FLUSHING TOILETS, BATHING, AND LAWN OR GARDEN WATERING.

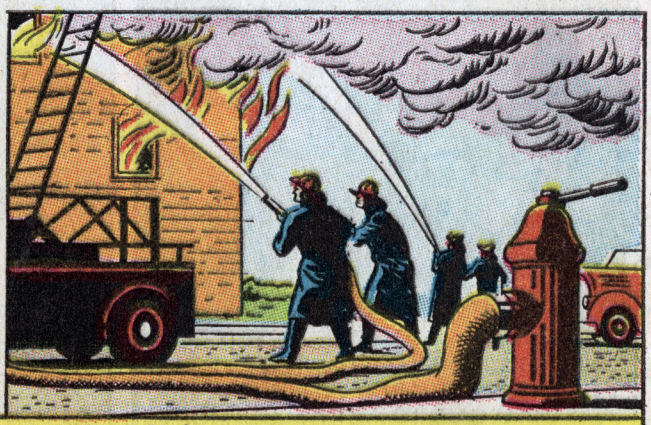
## 50 GAL.- INDUSTRIAL



A GOOD WATER SUPPLY ATTRACTS INDUSTRY, PROMOTES PROSPERITY IN YOUR COMMUNITY.

## 10 GAL.- PUBLIC



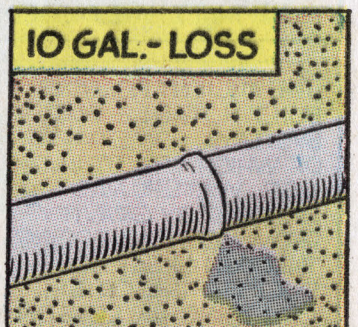


PUBLIC USES OF WATER INCLUDE FIRE FIGHTING, STREET SPRINKLING, SWIMMING POOLS, PUBLIC FOUNTAINS AND WATER FOR PUBLIC BUILDINGS.

## 20 GAL.- COMMERCIAL

THE CLEANLINESS OF EVERY PLACE OF BUSINESS, AS WELL AS ITS OPERATIONS DEPENDS ON WATER. THE FRESHNESS OF FLORISTS FLOWERS, SHAMPOOS AT BEAUTY SHOPS, THE TASTE OF TEA AND COFFEE—ALMOST EVERYTHING IN EVERYDAY LIFE EVEN LIFE ITSELF DEPENDS ON AN ADEQUATE WATER SUPPLY

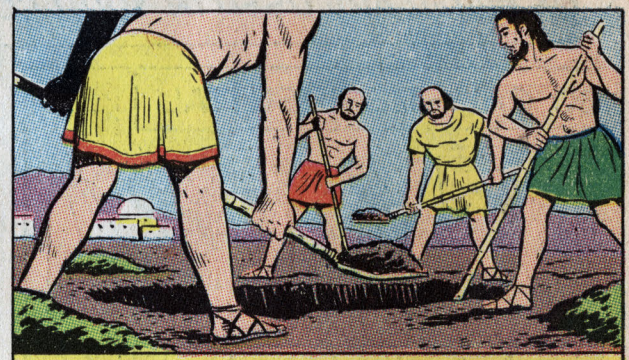
## 10 GAL.- LOSS



UNFORTUNATELY THERE IS ALSO SOME LOSS OF WATER THROUGH LEAKS AND BREAKS IN UNDERGROUND PIPES.

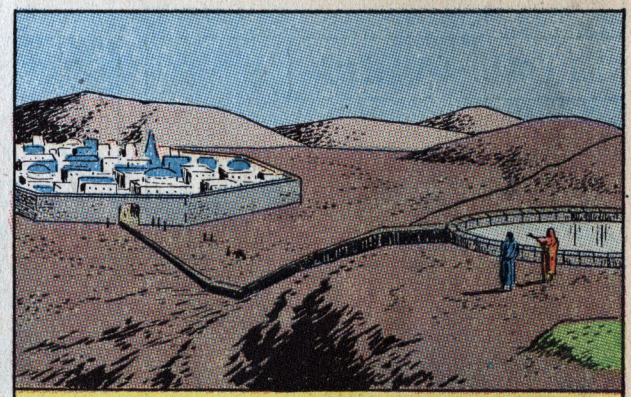
TODAY WE TAKE FOR GRANTED OUR SUPPLY OF SAFE WATER AT OUR FINGERTIPS, BUT IT WOULD HAVE BEEN A DIFFERENT STORY HAD WE LIVED IN AN EARLIER PERIOD IN MAN'S HISTORY···

ANCIENT MAN HAD TO SCOOP HIS WATER FROM SPRINGS AND STREAMS, INSTINCTIVELY PICKING ONLY THOSE PLACES WHERE ANIMALS DRANK, AS A SOURCE OF SAFE WATER.



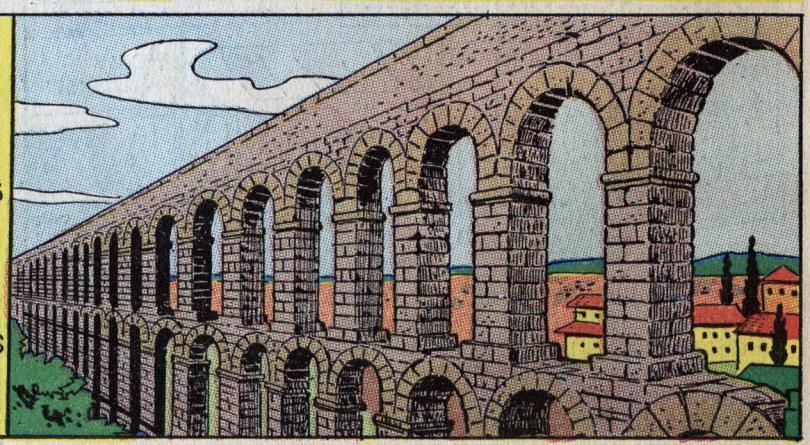
THE FIRST "PUBLIC WATER SYSTEMS" WERE WELLS. HISTORY TRACES THEM THROUGH THE AGES. THEY WERE USED IN PERSIA, PALESTINE, INDIA, AND CHINA BEFORE THE CHRISTIAN ERA. PERSIAN WELLS REACHED DEPTHS OF 80 TO 300 FT., AND ONE IN CHINA IS SAID TO HAVE REACHED 1,500 FT. DEEP.

ANCIENT STRIFE OVER WATER IS FOUND IN GENESIS (21:30) WHERE WE FIND ABRAHAM SAID TO ABIMELECH IN A DISPUTE OVER A WELL "THESE SEVEN EWE LAMBS SHALT THOU TAKE OF MY HAND, THAT THEY MAY BE A WITNESS UNTO ME THAT I HAVE DIGGED THIS WELL."

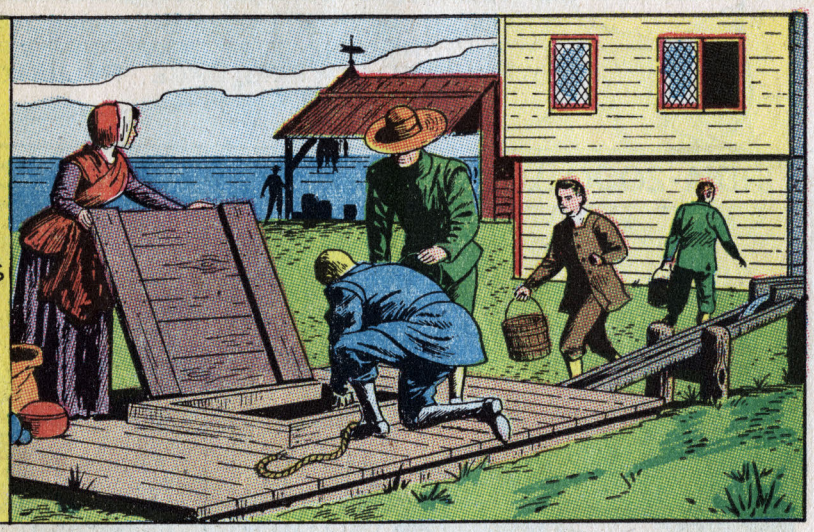


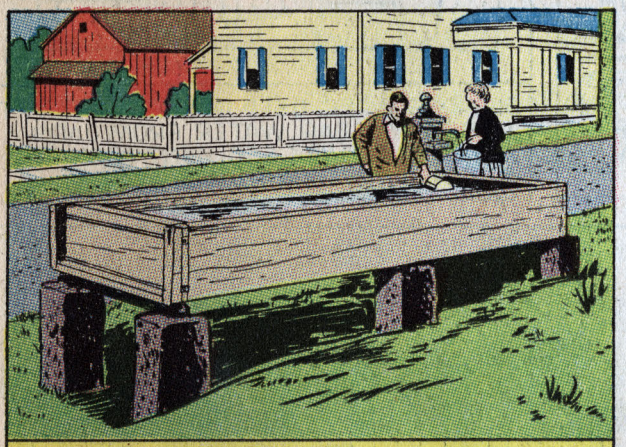
SOME CENTURIES LATER HEZEKIAH "MADE A POOL AND A CONDUIT AND BROUGHT WATER INTO THE CITY OF JERUSALEM" (II KINGS 20:20) THIS TRANSPORTATION OF WATER BY PIPELINE WAS A MAJOR STEP FORWARD IN PUBLIC WATER SUPPLY.

THE ANCIENT ROMANS BUILT NOTABLE WATER SYSTEMS, SOME PARTS OF WHICH ARE STILL IN USE. WATER WAS BROUGHT BY GRAVITY FROM MOUNTAIN SPRINGS THROUGH GREAT AQUEDUCTS TO THE CITIES, CROSSING VALLEYS ON IMPOSING STONE ARCHES. BUT IT WAS NOT UNTIL THE INVENTION OF STEAM PUMPS THAT WATER SYSTEMS AS WE KNOW THEM WERE BUILT.

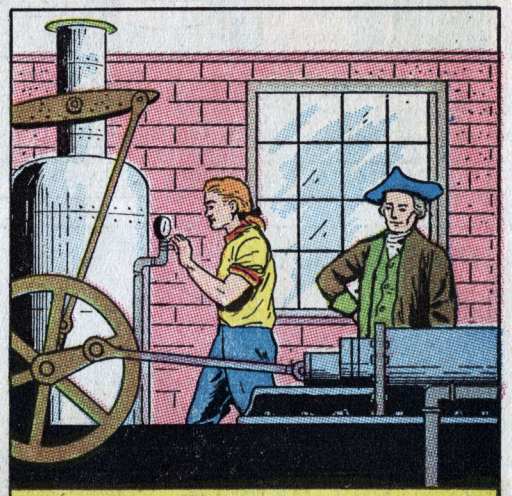


AND IN AMERICA . . . AMERICA'S FIRST PIPED WATER SUPPLY WAS BUILT IN BOSTON IN 1652 ALONG WHAT IS NOW KNOWN AS CONDUIT STREET. WATER WAS BROUGHT IN CONDUITS, OR PIPES, FROM SPRINGS AND WELLS TO A WOODEN TANK (RESERVOIR) 12 FEET SQUARE, FROM WHICH PEOPLE FILLED THEIR WATER BUCKETS.

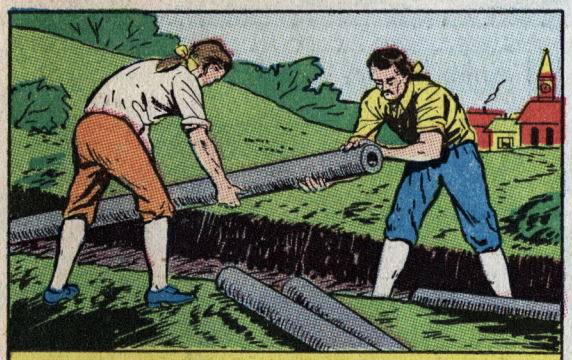




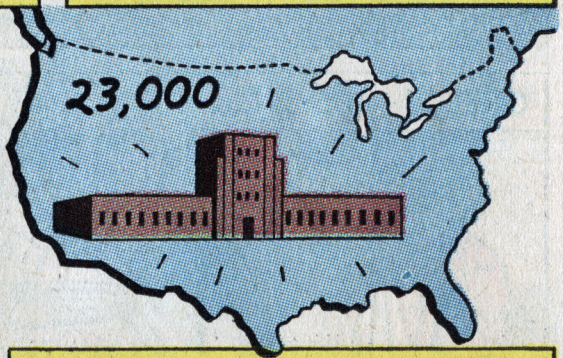
ABOUT 1746 A FARMER NAMED SCHAEFFER PIPED A SUPPLY OF WATER FROM A SPRING ON HIS PENNSYLVANIA FARM TO THE COMMUNITY NOW CALLED SCHAEFFERSTOWN IN HIS HONOR. THIS WAS THE FIRST WATER SUPPLY BUILT TO SERVE AN ENTIRE TOWN.



THE FIRST WATER WORKS USING STEAM ENGINES TO PUMP WATER UPHILL WAS BUILT IN 1764 IN THE GERMAN MORAVIAN TOWN OF BETHLEHEM, PA.



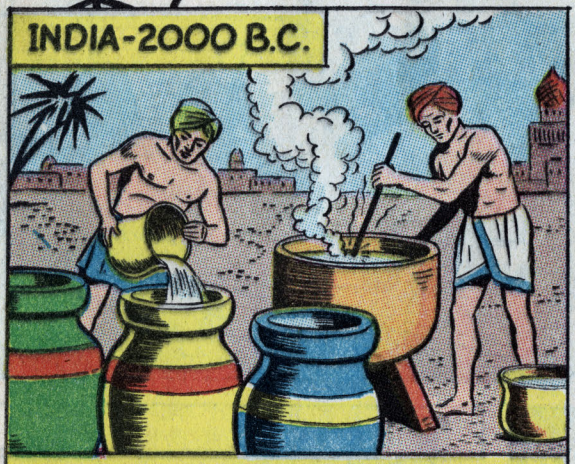
IN 1774 MORAVIAN SETTLERS WHO HAD HEADED SOUTH FROM BETHLEHEM FOUNDED THE TOWN OF SALEM (NOW WINSTON-SALEM, N.C.) HERE THEY WORKED ON A GRAVITY SYSTEM OF WATER SUPPLY WHICH WAS COMPLETED IN MARCH 1776.




IN THE ALMOST-CENTURY-AND-A-HALF FROM BOSTON'S CONDUIT SUPPLY TO 1800, HISTORY RECORDS ONLY NINE WATER WORKS IN AMERICA. TODAY MORE THAN 23 000 WATER WORKS SUPPLY BILLIONS AND BILLIONS OF GALLONS DAILY TO MORE THAN 175 MILLION PEOPLE IN THE U.S. AND CANADA.

THROUGH THE CENTURIES THE SEARCH FOR SAFE WATER KEPT PACE WITH CIVILIZATION. DOWN THROUGH THE AGES MAN STRUGGLED FOR EXISTENCE, RELIED ON AN INADEQUATE WATER SUPPLY.

## INDIA-2000 B.C.



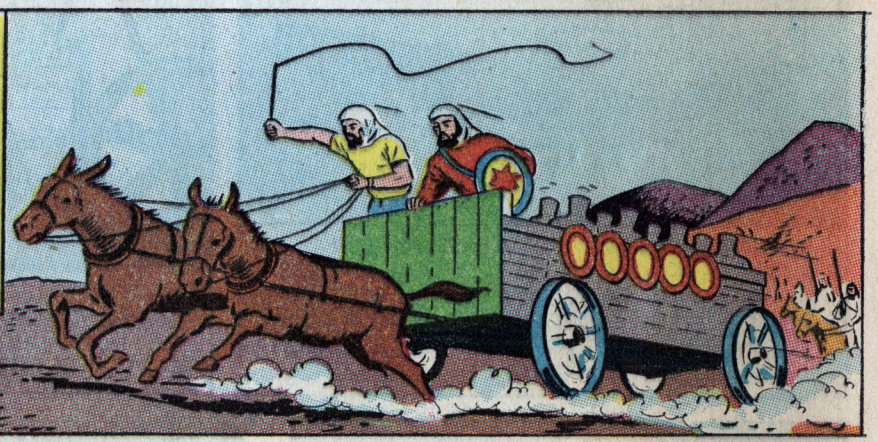
"IT IS DIRECTED TO HEAT FOUL WATER BY BOILING AND EXPOSING TO SUNLIGHT AND BY DIPPING SEVEN TIMES INTO IT A PIECE OF HOT COPPER, THEN TO FILTER AND COOL IN AN EARTHEN VESSEL."

## EGYPT-1450 B.C.

SIPHONS WERE USED IN ANCIENT EGYPT TO DRAW CLEAR WATER FROM JARS AFTER THE THICK SEDIMENT, FROM THE NILE, HAD SETTLED TO THE BOTTOM.

## PERSIA-600 B.C.

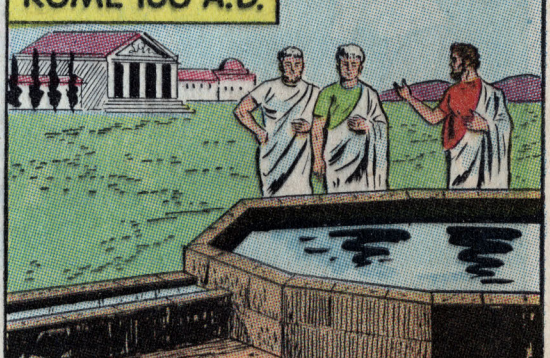
CYRUS THE GREAT, WHEN GOING TO WAR, TOOK BOILED WATER IN SILVER FLAGONS OR JARS LOADED ON FOUR-WHEELED CARTS DRAWN BY MULES.



## GREECE - 400 B.C.

HIPPOCRATES THE FATHER OF MEDICINE ASSERTED THAT RAIN WATERS SHOULD BE BOILED AND STRAINED FOR OTHERWISE THEY WOULD SMELL BAD AND CAUSE HOARSENESS.

## ROME 100 A.D.

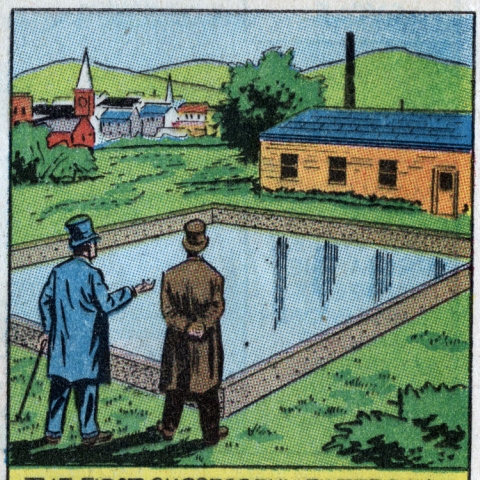


FRONTINUS DESCRIBED SETTLING RESERVOIRS AND PISCINAE, OR PEBBLE CATCHERS, BUILT INTO THE AQUEDUCTS.

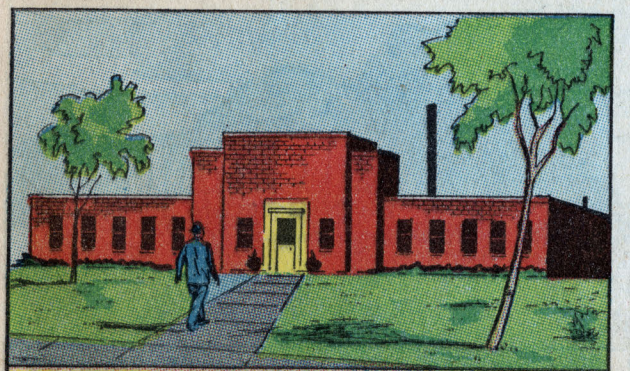
IN 1852 THE CITY OF LONDON WAS REQUIRED BY PARLIAMENT TO FILTER ITS WATER THROUGH SAND FILTERS.

IN 1885 LABORATORY EXAMINATION OF LONDON'S WATER SUPPLY FIRST SHOWED THAT BACTERIA, AS WELL AS THE LARGER IMPURITIES, WERE REMOVED BY FILTERS.

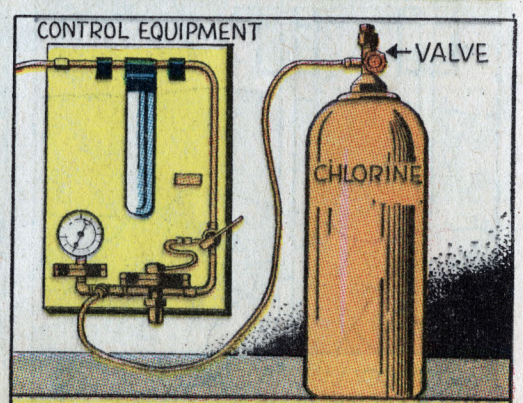
IN 1892 THE VALUE OF FILTRATION WAS PROVED WHEN AN EPIDEMIC OF CHOLERA STRUCK THE CITIZENS OF HAMBURG, GERMANY, WHO DRANK UNFILTERED WATER FROM THE ELBE. JUST ACROSS THE RIVER WHERE THE WATER SUPPLY WAS FILTERED, RESIDENTS OF ALTONA REMAINED HEALTHY.



THE FIRST SUCCESSFUL FILTERS IN THE UNITED STATES WERE INSTALLED IN POUGHKEEPSIE, N.Y., IN 1872



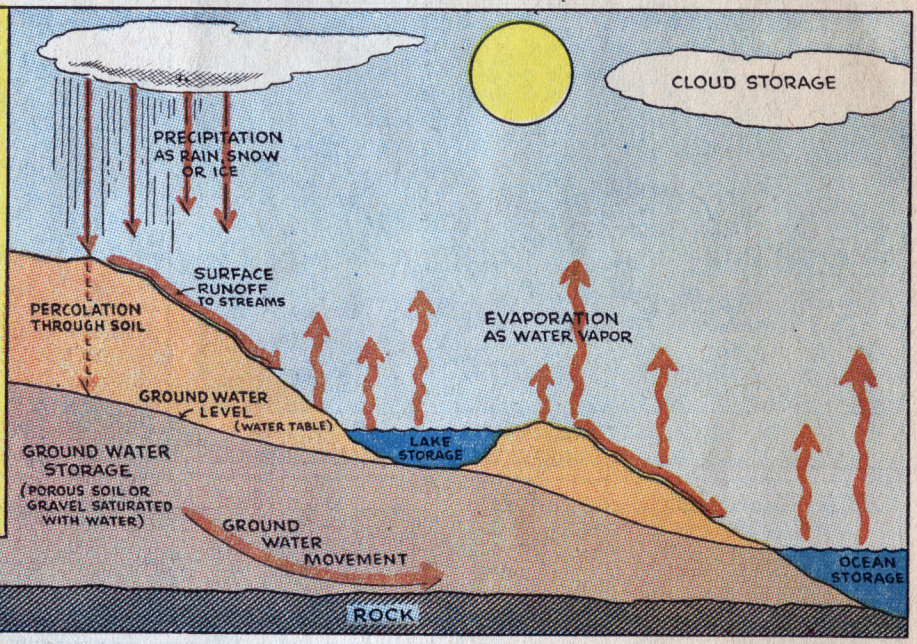
IN 1902 ONE OF THE FIRST FILTER PLANTS WITH MODERN MECHANICAL FILTERS WAS BUILT AT LITTLE FALLS, N.J. THESE FILTERS ARE STILL BEING USED BY THE PASSAIC VALLEY WATER COMMISSION.



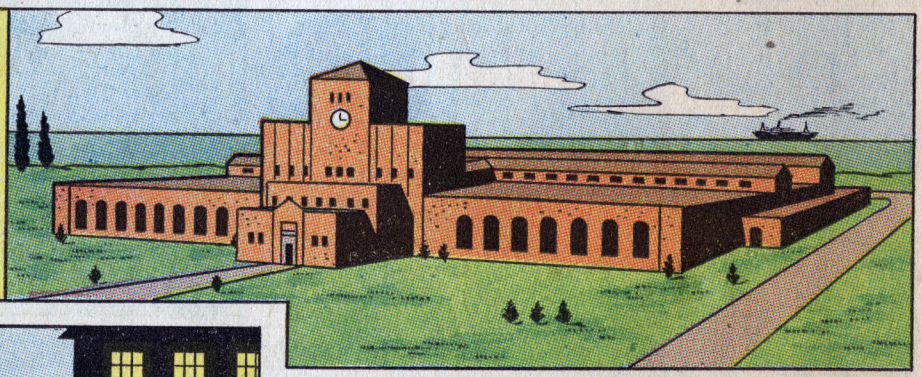

THEN, IN 1912, LIQUID CHLORINE WAS FIRST APPLIED TO DESTROY DISEASE-PRODUCING BACTERIA. TODAY EVERY LARGE CITY CHLORINATES ITS WATER.

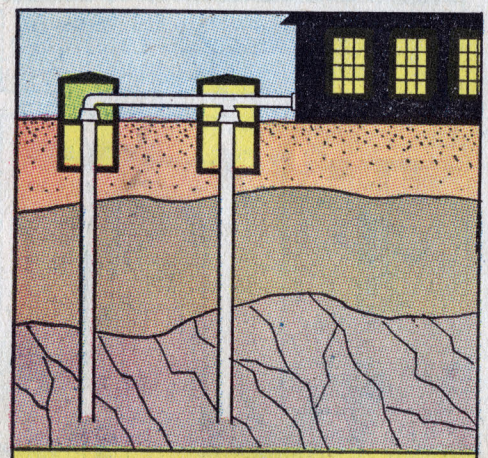
NOW FOLKS, LET US SEE HOW OUR MODERN WATER SUPPLY SYSTEM WORKS—THE FIRST THING TO CONSIDER IS THE **SOURCE OF WATER**

THE SOURCES OF ALL OUR WATER SUPPLIES ARE RIVERS, LAKES AND UNDERGROUND RESERVOIRS. AS WE DRAW WATER FROM THESE THEY ARE REFILLED BY RAINFALL. THE CONSTANT MOVEMENT OF WATER, FROM CLOUDS TO EARTH AND BACK AGAIN, IS CALLED THE **HYDROLOGIC CYCLE.**

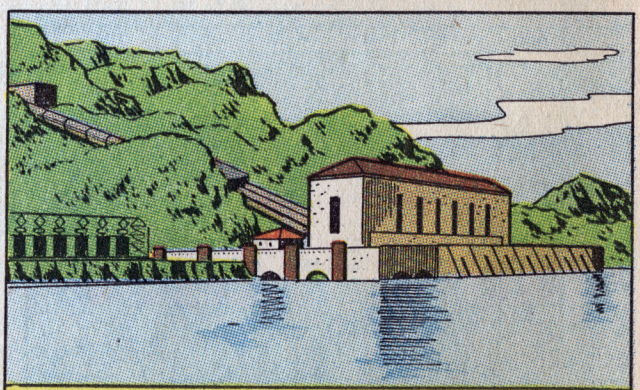



MANY LARGE CITIES USE THE WATER FROM THE RIVERS OR LAKES ON WHOSE SHORES THEY WERE FOUNDED





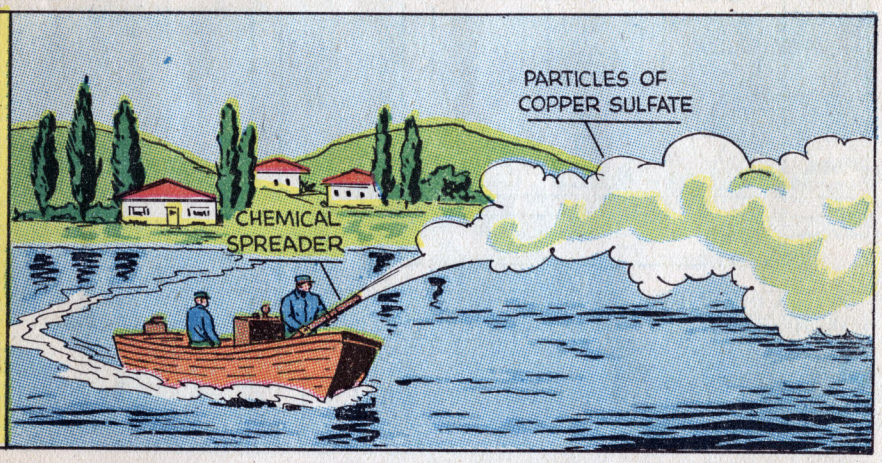
MANY COMMUNITIES BY PREFERENCE OR BECAUSE NO LARGE BODY OF SURFACE WATER IS AVAILABLE DEPEND ON UNDERGROUND SOURCES SUCH AS WELLS AND SPRINGS FOR THEIR WATER SUPPLIES.

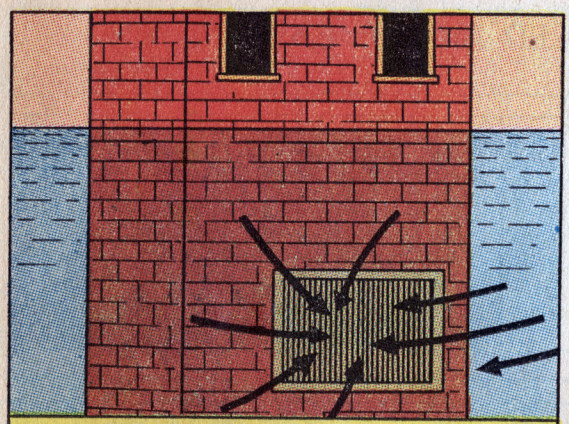


SOME CITIES LIKE NEW YORK AND LOS ANGELES BRING WATER MANY MILES FROM UPLAND SOURCES, WATER FROM THE COLORADO RIVER IS CARRIED 400 MILES THROUGH AQUEDUCTS AS LARGE AS 16 FEET IN DIAMETER TO SUPPLY FOUR MILLION PEOPLE IN SOUTHERN CALIFORNIA.

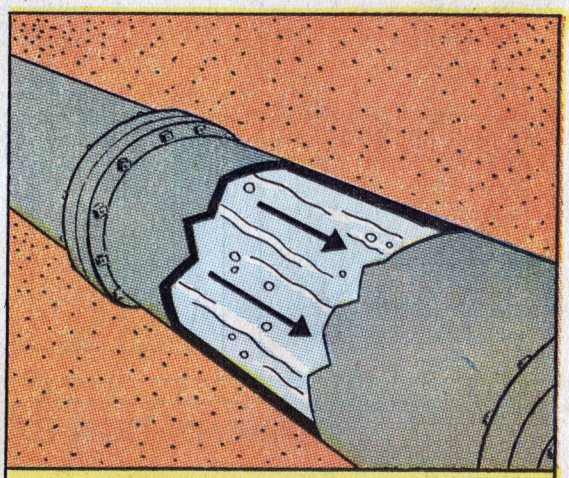
IF YOU'RE GETTING YOUR WATER FROM SURFACE SOURCES HERE ARE SOME OF THE THINGS YOUR WATER WORKS MAY HAVE TO DO TO IT ON THE WAY TO YOUR FAUCET.....

IF YOUR SUPPLY COMES FROM A LAKE OR RESERVOIR, THE WATER THERE WILL SOMETIMES REQUIRE TREATMENT WITH CHEMICALS TO CONTROL THE GROWTH OF MICROSCOPIC PLANTS, CALLED "ALGAE," WHICH CAN CAUSE BAD TASTE AND ODORS IN YOUR DRINKING WATER



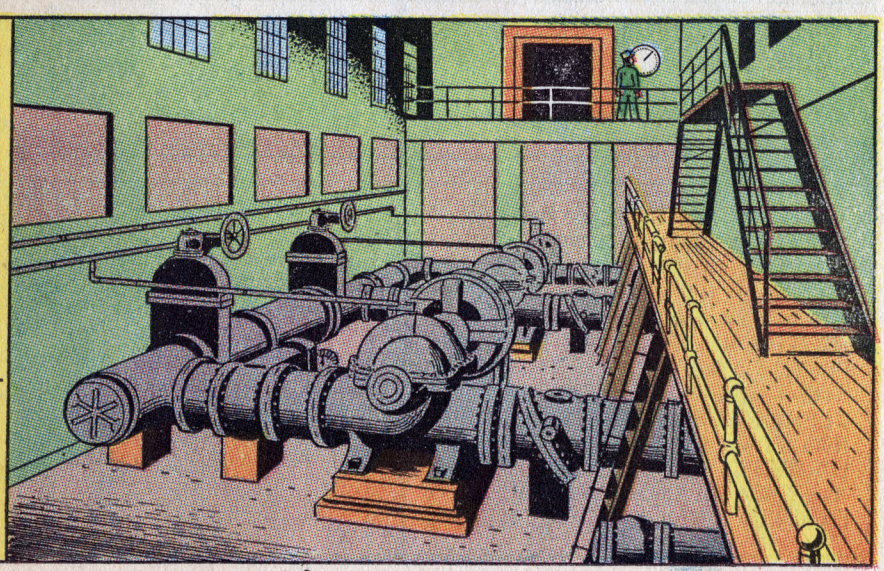



SURFACE WATERS ARE DRAWN INTO THE SYSTEM THROUGH AN INTAKE STRUCTURE WHICH IS SCREENED TO KEEP OUT STICKS AND OTHER DEBRIS AS WELL AS FISH

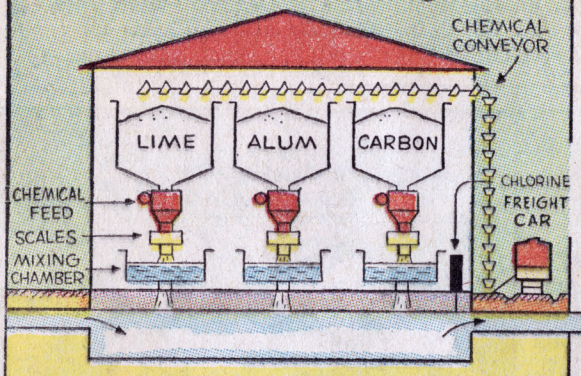


NEXT COMES A TRIP THROUGH A LARGE TRANSMISSION LINE TO THE TREATMENT PLANT

ALTHOUGH THE TRIP IS OCCASIONALLY MADE BY GRAVITY FLOW, MOST OFTEN THE RAW WATER MUST BE PUMPED FROM THE SOURCE TO THE PLANT. BEFORE THE WATER ENTERS THE TREATMENT PLANT, THE AMOUNT IS MEASURED.



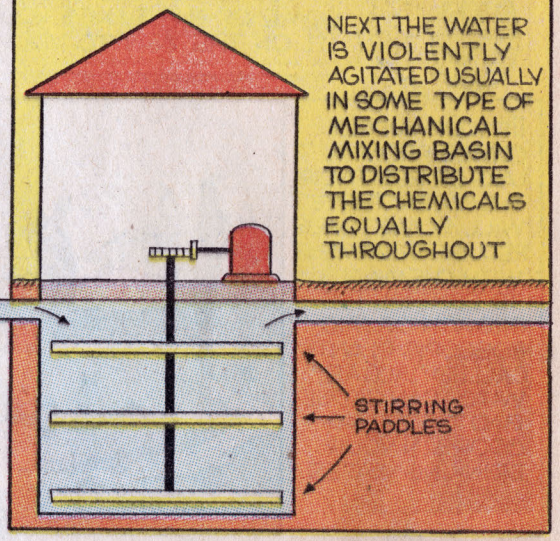
## CHEMICAL FEEDERS




WHEN THE WATER REACHES THE TREATMENT PLANT, CHEMICALS TO HELP REMOVE IMPURITIES, TO KILL HARMFUL BACTERIA, TO DESTROY ANY BAD TASTES OR ODORS, AND, IF NECESSARY, TO MAKE THE SUPPLY SOFTER OR TO MAKE IT LESS RUST-FORMING, ARE ADDED.

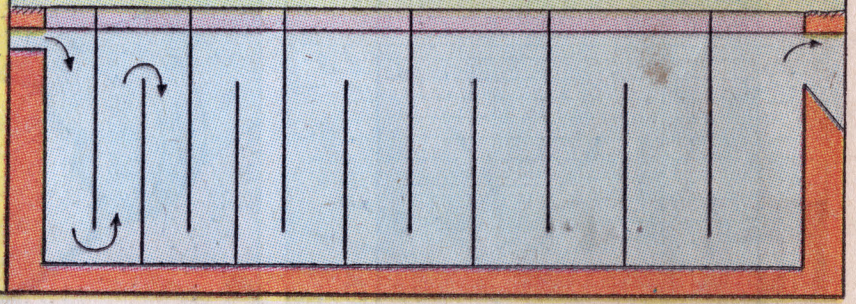
## MECHANICAL MIXING BASIN

NEXT THE WATER IS VIOLENTLY AGITATED USUALLY IN SOME TYPE OF MECHANICAL MIXING BASIN TO DISTRIBUTE THE CHEMICALS EQUALLY THROUGHOUT

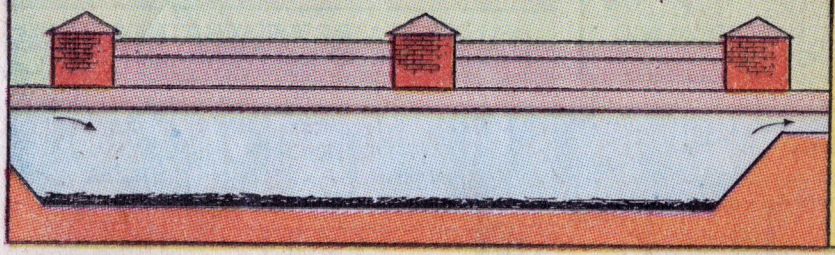



THE MIXING IS THEN CONTINUED LESS VIOLENTLY EITHER BY REDUCING THE SPEED OF THE MECHANICAL MIXERS OR BY ZIG-ZAG FLOW AROUND A SERIES OF PARTITIONS IN A BASIN. THIS ADDITIONAL MIX AIDS THE REACTION OF THE CHEMICALS WITH THE WATER.

## BAFFLED MIXING BASIN



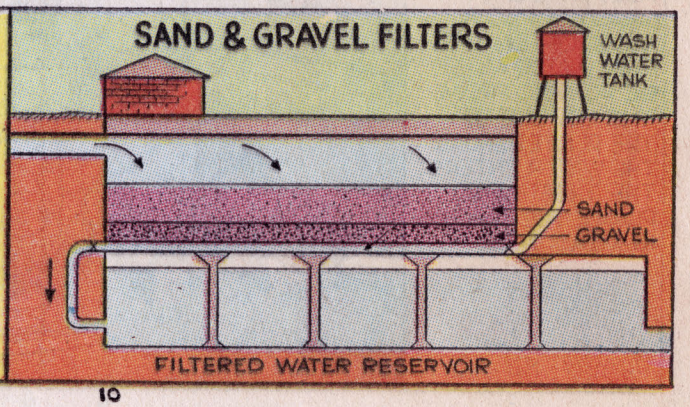
## SEDIMENTATION BASIN



FOLLOWING COMPLETION OF THE CHEMICAL REACTIONS, THE WATER ENTERS THE SEDIMENTATION BASINS, WHERE, WITH THE WATER ALMOST STILL, MANY OF THE CHEMICALLY TREATED IMPURITIES SINK TO THE BOTTOM

FROM THERE, THE PARTIALLY CLARIFIED WATER GOES THROUGH FILTERS, WHERE SAND AND GRAVEL STRAIN OUT THE REMAINING IMPURITIES, TO A FILTERED WATER RESERVOIR. BECAUSE THE IMPURITIES COLLECT ON THE SAND, THE FILTERS MUST BE KEPT CLEAN. THIS IS DONE BY WASHING WITH FILTERED WATER, USUALLY FORCED UPWARD THROUGH THE GRAVEL AND SAND AND THEN DRAINED OFF IN SPECIAL GUTTERS

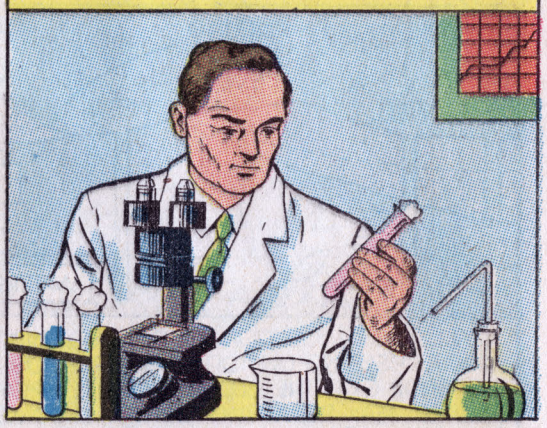
## SAND & GRAVEL FILTERS



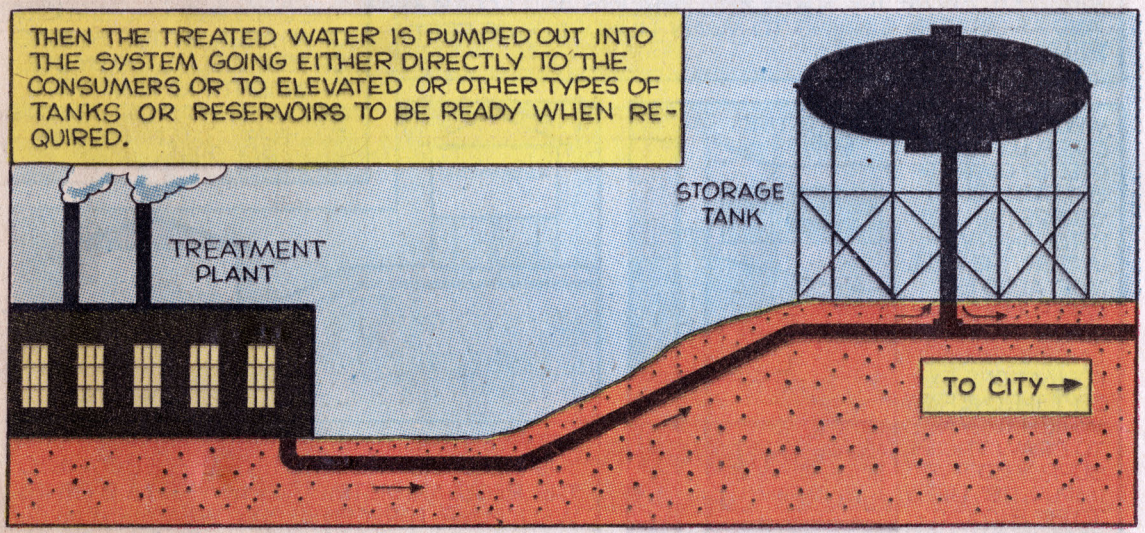
BEFORE SENDING THE FINISHED PRODUCT ON ITS WAY, THE WATER WORKS USUALLY GIVES IT A FINAL TREATMENT WITH CHLORINE TO KILL ANY HARMFUL BACTERIA THAT MAY HAVE SURVIVED THE REGULAR TREATMENT PROCESS.

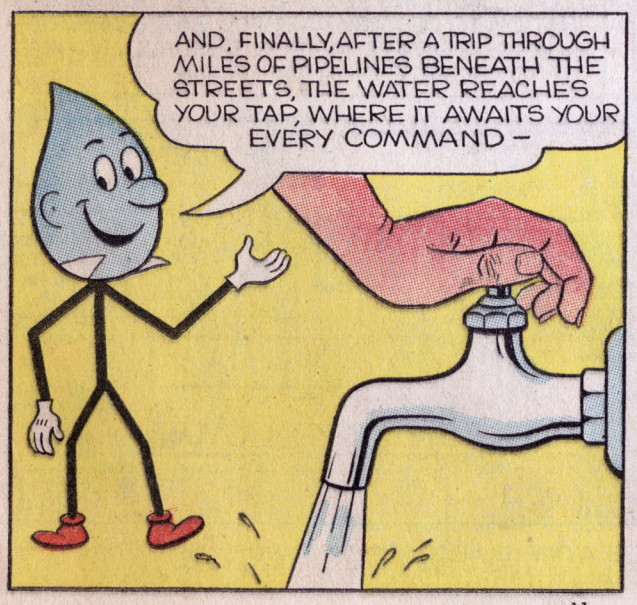
## CHLORINATION

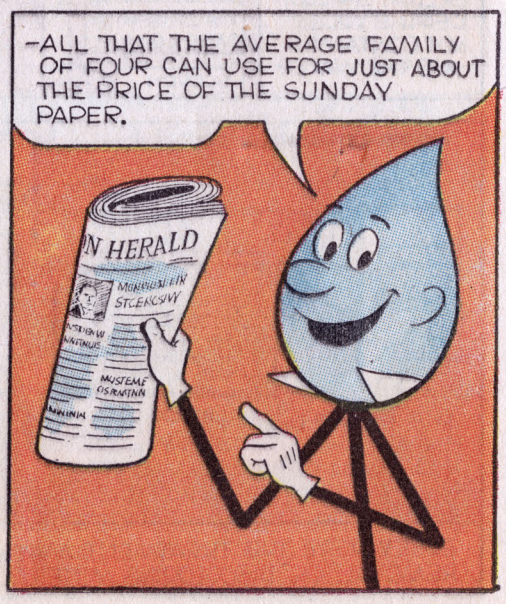
BEFORE AND DURING ITS TREATMENT, AS WELL AS WHILE IT IS IN THE DISTRIBUTION SYSTEM, WATER IS KEPT UNDER CONSTANT CHECK IN THE LABORATORY OF THE TREATMENT PLANT.



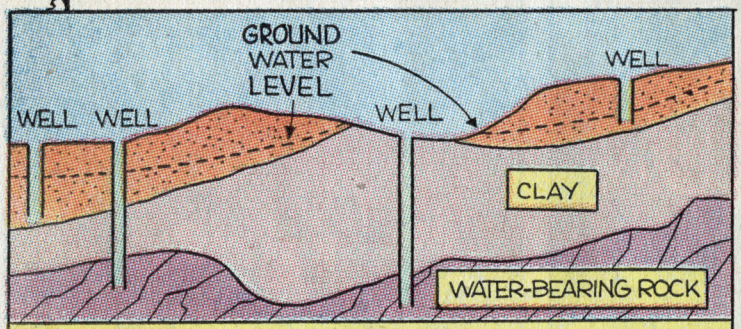
THEN THE TREATED WATER IS PUMPED OUT INTO THE SYSTEM GOING EITHER DIRECTLY TO THE CONSUMERS OR TO ELEVATED OR OTHER TYPES OF TANKS OR RESERVOIRS TO BE READY WHEN REQUIRED.



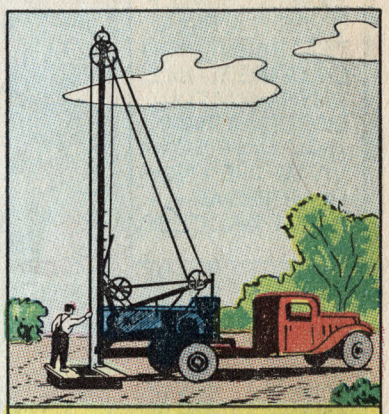


AND, FINALLY, AFTER A TRIP THROUGH MILES OF PIPELINES BENEATH THE STREETS, THE WATER REACHES YOUR TAP, WHERE IT AWAITS YOUR EVERY COMMAND –



IF YOUR WATER SUPPLY COMES FROM UNDERGROUND SOURCES IT WILL USUALLY REQUIRE LESS TREATMENT, AS THE GROUND ITSELF WILL PERFORM MUCH OF THE FILTRATION AND PURIFICATION.

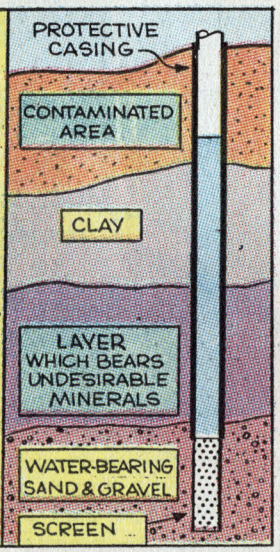


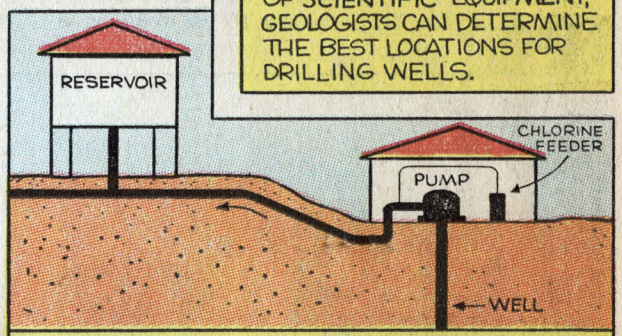

WELLS DRAW WATER FROM POROUS UNDERGROUND FORMATIONS RESTING ON TOP OF NONPOROUS FORMATIONS. DEPENDING ON THE GEOLOGY OF THE AREA, THE GROUND WATER MAY BE AT ANY DEPTH - IN SOME PLACES CROPPING OUT ABOVE THE SURFACE IN SPRINGS AND POOLS AND AT OTHERS SINKING TO MANY HUNDREDS OF FEET BELOW THE SURFACE.



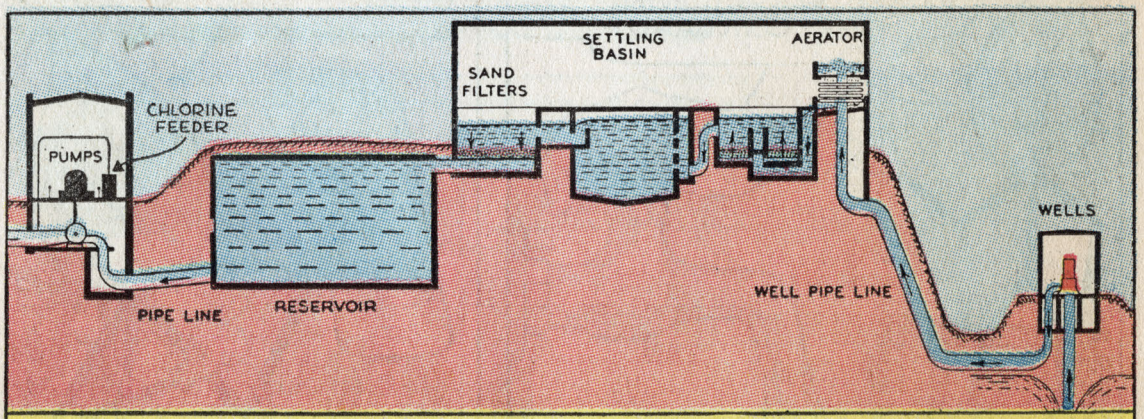
FROM THEIR KNOWLEDGE OF THE UNDERGROUND STRUCTURE OF AN AREA, BY THE SINKING OF TEST WELLS, AND BY USE OF SCIENTIFIC EQUIPMENT, GEOLOGISTS CAN DETERMINE THE BEST LOCATIONS FOR DRILLING WELLS.

WELLS MUST BE CAREFULLY DEVELOPED BY COMPETENT DRILLERS TO SECURE THE LARGEST QUANTITY OF WATER. THE WELL MUST ALSO BE CAREFULLY SEALED OFF FROM ALL UNDERGROUND FORMATIONS EXCEPT THE ONE FROM WHICH THEY ARE TO DRAW THEIR SUPPLY SO THAT IMPURITIES LIKELY TO BE ENCOUNTERED AT SHALLOW DEPTHS WILL NOT CONTAMINATE THE WATER



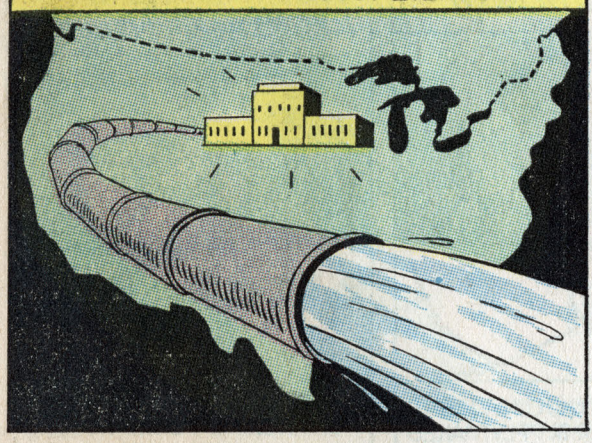




BETWEEN THE TIME THE WATER EMERGES FROM THE WELL AND THE TIME IT IS PUSHED OUT INTO THE REGULAR DISTRIBUTION SYSTEM BY THE WELL PUMP, IT RECEIVES SUCH TREATMENT AS THE LOCAL CONDITIONS REQUIRE. WHEN ONLY CHLORINATION TO DESTROY HARMFUL BACTERIA IS REQUIRED, A SIMPLE FEEDER IS USUALLY HOOKED UP TO OPERATE WITH THE PUMP.

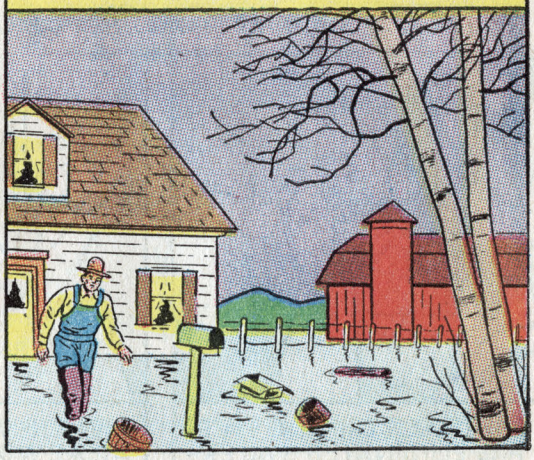



ELSEWHERE THE TREATMENT MAY BE MORE ELABORATE, REQUIRING SOFTENING, REMOVAL OF DISCOLORING MINERALS AND IMPROVEMENT OF TASTES AND ODORS.

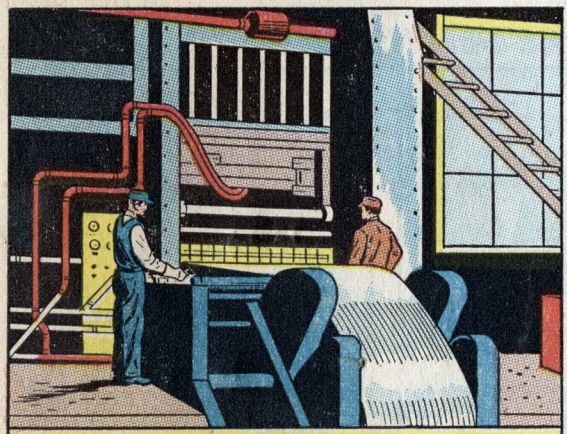
AMERICAN WATER WORKS NOW SUPPLY ALMOST **25 BILLION GALLONS** OF WATER EVERY DAY! — ABOUT 100 MILLION TONS OF PRODUCT EVERY DAY



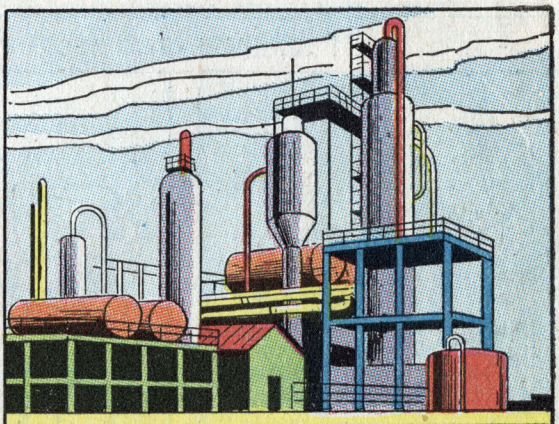
— ENOUGH IN A YEAR TO FLOOD AN AREA 15 INCHES DEEP AND MORE THAN 10 MILES WIDE ALL THE WAY ACROSS THE U.S.



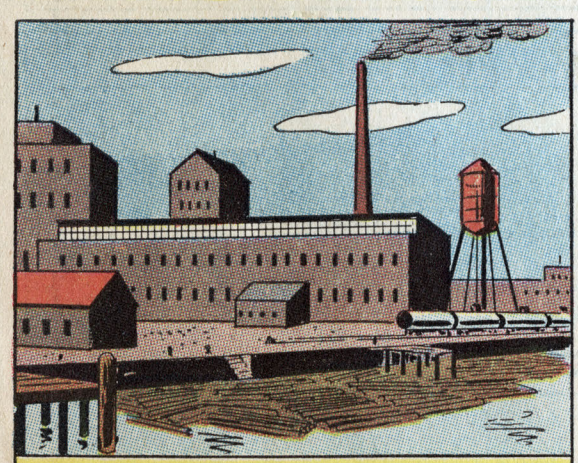
*IN ADDITION TO SUPPLYING PERSONAL REQUIREMENTS THIS SUPPLY IS AN IMPORTANT FACTOR IN INDUSTRIAL PRODUCTION — FOR WASHING, COOLING, AND SPECIAL PROCESSES.*



**STEEL-** AS MUCH AS 110,000 GAL. PER NET TON OF ROLLED STEEL



**GASOLINE -** 500 GAL. PER GAL. OF GASOLINE



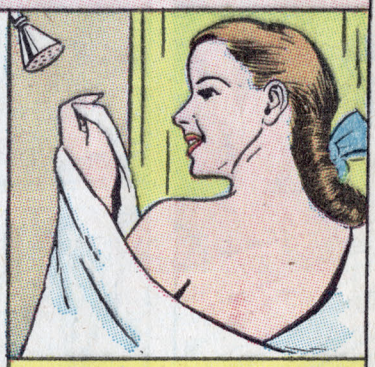
**PAPER -** UP TO 90,000 GAL. PER TON OF PAPERBOARD

**TEXTILES-** 510 GAL PER YARD OF WOOLEN CLOTH

**WATER IS PRECIOUS!** A CITY WITHOUT AN ADEQUATE WATER SUPPLY IS A CITY WITHOUT A FUTURE.

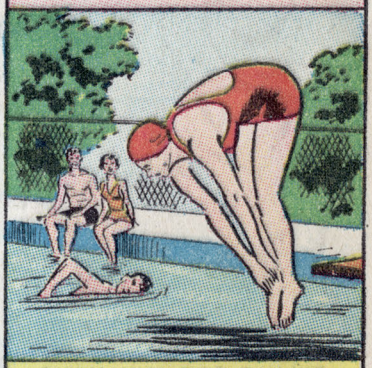
## WATER PROTECTS AND PROMOTES **PUBLIC HEALTH...**

SAFE PUBLIC DRINKING WATER HAS ELIMINATED WATER-BORNE DISEASES SUCH AS TYPHOID AND CHOLERA.



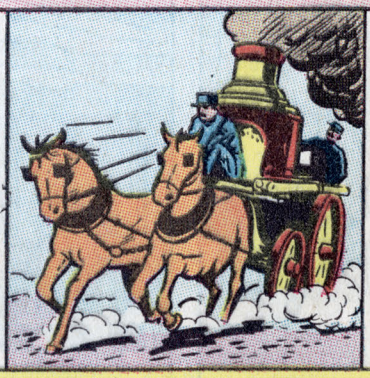
INEXPENSIVE AND CONVENIENT, A PURE WATER SUPPLY MAKES CLEANLINESS, BOTH PERSONAL AND PUBLIC, EASY.

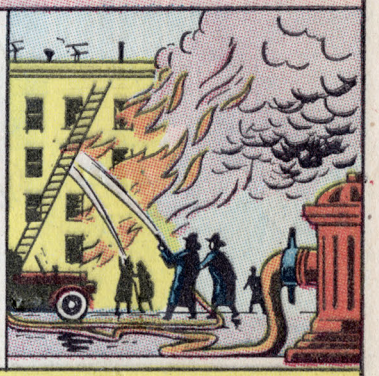
## IT CONTRIBUTES TO **RECREATION...**



SWIMMING POOLS MAKE SEASHORE FUN AVAILABLE ALMOST EVERYWHERE.

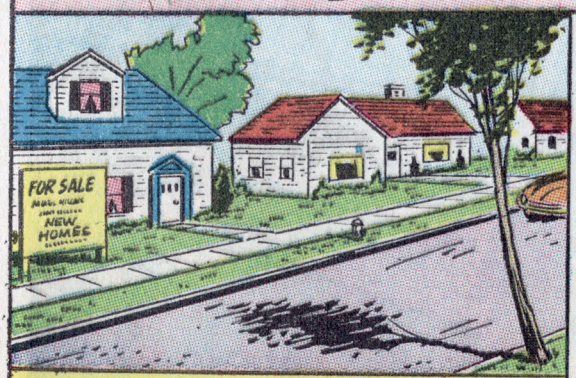
## IT STRENGTHENS YOUR **FIRE DEFENSES...**



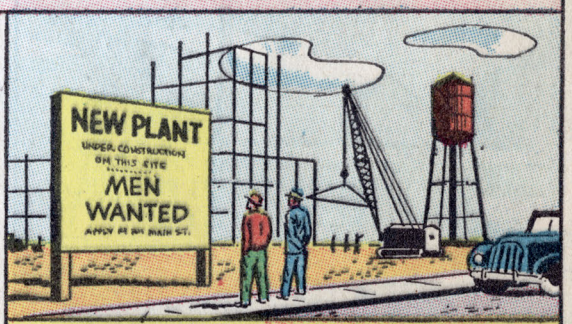


FROM BUCKET BRIGADE TO PRESENT DAY FIRE FIGHTER, WATER HAS BEEN THE ESSENTIAL ELEMENT. THE BETTER YOUR WATER SUPPLY, THE SAFER YOU ARE FROM DAMAGING FIRES, AND THE SAFER YOU ARE, OF COURSE, THE LESS YOU NEED PAY FOR FIRE INSURANCE.

## IT STIMULATES **COMMUNITY GROWTH...**




NEW AREAS ARE OPENED TO DEVELOPMENT AS WATER SUPPLY IS MADE AVAILABLE; AND THE CITY GROWS WITH SUCH DEVELOPMENT.




ALMOST ALL TYPES OF INDUSTRY REQUIRE LARGE QUANTITIES OF WATER, FOR AIR CONDITIONING IF NOT FOR PROCESSING. THE CITY THAT HAS INADEQUATE SUPPLY WILL NOT ATTRACT NEW BUSINESS.

# WATER IS PRECIOUS - USE IT BUT DON'T WASTE IT!

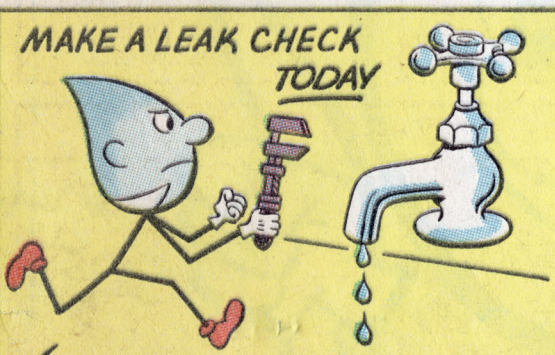
A SLOW DRIP WASTES 15 GALLONS PER DAY!

1/32" LEAK WASTES **25** GALLONS IN 24 HOURS

1/16" LEAK WASTES **100** GALLONS IN 24 HOURS

1/8" LEAK WASTES **400** GALLONS IN 24 HOURS

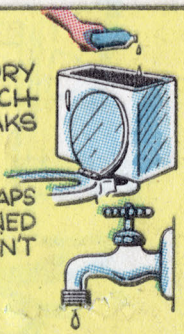
## MAKE A LEAK CHECK TODAY



✓ CHECK ALL FAUCETS FROM ATTIC TO CELLAR.

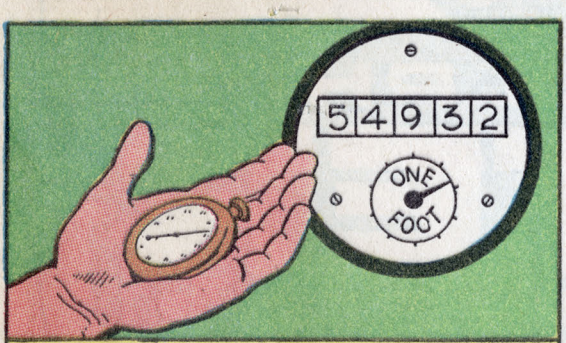
WATCH HOT WATER FAUCETS PARTICULARLY; THE HEAT AFFECTS THEM AND YOU LOSE BOTH WATER AND HEAT.

✓ CHECK FLUSH TANKS OF TOILETS BY PLACING LAUNDRY BLUING IN TANK AND WATCHING BOWL TO SEE IF IT LEAKS THROUGH.



✓ CHECK OUTSIDE WATER TAPS TO SEE THAT THEY ARE TURNED OFF WHEN NOT IN USE; DON'T DEPEND UPON THE HOSE NOZZLE, USE THE FAUCET.

✓ TURN OFF FAUCETS THAT ARE HOOKED UP TO WASHING MACHINES AND OTHER WATER-USING EQUIPMENT WHEN IT IS NOT IN USE, BOTH TO PRESERVE EQUIPMENT AND TO AVOID LEAKS.

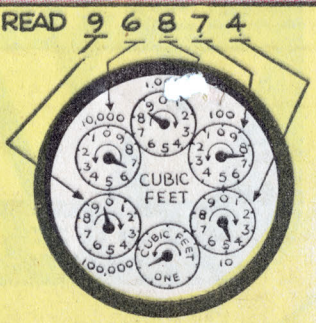



## USE YOUR METER...

TO MAKE A CHECK FOR INVISIBLE LEAKS, TURN OFF ALL WATER TAPS IN THE HOUSE AND OUTSIDE AND WATCH THE "ONE CUBIC FOOT" OR "TEN GALLON" INDICATOR TO SEE IF IT MOVES. BY TIMING THE MOVEMENT YOU CAN DETERMINE HOW MANY CUBIC FEET OR GALLONS PER MINUTE ARE BEING WASTED. ONE CUBIC FOOT EQUALS 7½ GALLONS.

## HOW TO READ YOUR WATER METER

READ 9 6 8 7 4




THE STRAIGHT READING TYPE OF METER (AT LEFT) IS READ LIKE AN AUTOMOBILE SPEEDOMETER. THUS THE READING ON THE METER AT THE LEFT WOULD BE "54,932 CUBIC FEET"

THE CIRCULAR READING METER, PICTURED HERE, IS READ BY NOTING THE FIGURES ON THE DIALS AS SHOWN IN THE ILLUSTRATION. WHEN A POINTER IS BETWEEN TWO FIGURES READ THE LOWER FIGURE. IF A POINTER SEEMS TO BE DIRECTLY ON A FIGURE, READ THE LOWER FIGURE, UNLESS THE POINTER ON THE NEXT LOWER DIAL HAS PASSED ZERO.

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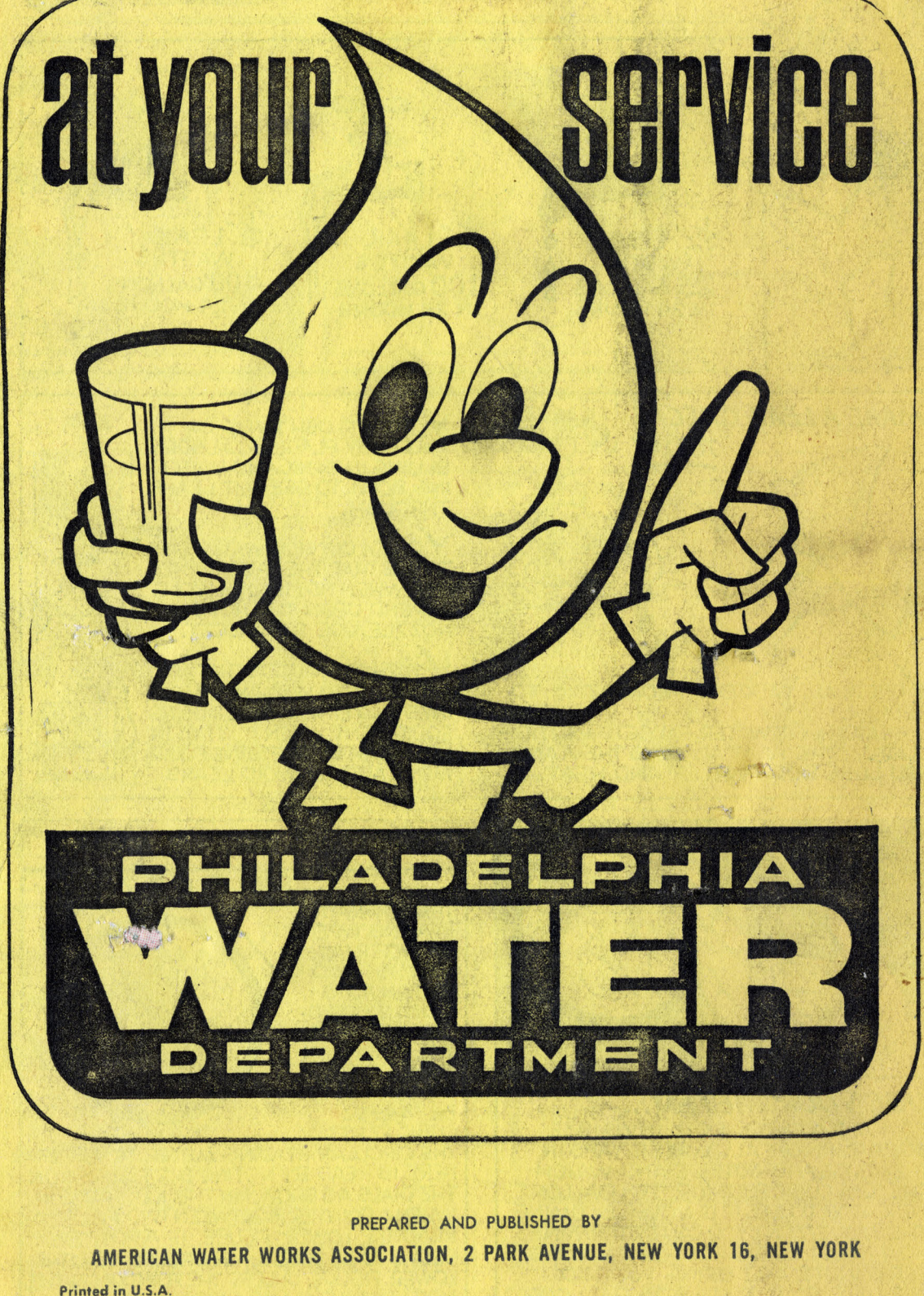


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